This is a process for applying blocking contacts on an n-type CdZnTe specimen includes cleaning the CdZnTe specimen, etching the CdZnTe specimen, chemically surface treating the CdZnTe specimen, and depositing blocking metal on at least one of a cathode surface and an anode surface of the CdZnTe specimen

Blocking Contacts for N-Type Cadmium Zinc Telluride

A process for applying blocking metal on semidconductor contacts

Description

This NASA Goddard Space Flight Center innovation entails of a process for applying blocking metal on semiconductor contacts on n-type Cadmium Zinc Telluride (CdZnTe) for the purpose of producing x-ray or gamma-ray detectors. The process steps include cleaning with conventional solvents, etching in a bromine solution to remove cutting and polishing damage, surface treating with a chemical, and depositing contacts using a shadow mask in combination with electron beam evaporation of the contact metal.

Cadmium Zinc Telluride (CdZnTe) has gained acceptance as a semiconductor detector material for x-ray and gamma ray applications ranging from astronomy to medical imaging. CdZnTe can be produced by several different Bridgman furnace configurations, for example High Pressure Bridgman (HPB) or Modified Horizontal Bridgman (MHB).

The inventive blocking contacts reduce CdZnTe detector leakage current by a factor of 10 at bias voltages typically used for n-type CdZnTe detectors with ohmic contacts (approximately 120 Volts per millimeter of thickness). The reduced leakage current noise produces improved spectral resolution. In addition, the reduced leakage current noise allows for the application of higher bias voltages (approximately 200 Volts per millimeter of thickness) thereby promoting full charge collection and further improving spectral resolution.

Benefits

- ***Reduced Detector Leakage:*** The blocking contacts produced by this process reduce CdZnTe detector leakage by a factor of 10
- ***Spectral Resolution:*** The reduced leakage current noise produces improved spectral resolution
- ***Higher Bias Voltages:*** The reduced leakage current noise produced by the contacts allows for the application of higher bias voltages which promote full charge collection
- ***Compatibility:*** The low leakage current block is compatible with newer generation application specific integrated circuits being designed for CdZnTe detector applications

Applications

Applications include semiconductor detector material for x-ray and gamma ray applications ranging from astronomy to medical imaging.

Patent Status

Patented—protected via US 8,093,094

Contact

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